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ABSTRACT

A study compared peripheral vision applied to letter-pair and Dolch word recognition. Subjects, 6 normal readers, 12 Chapter 1 students, and 34 learning disabled (and assumed dyslexic) students from grades one through three enrolled in a parochial school, a public school, and a university summer reading clinic, completed a test designed to estimate their reception speed of letters presented on a computer monitor at four different degrees of eccentricity (2.5, 5, 7.5, and 10 degrees). They were also tested on recognizing letter pairs and on recognizing Dolch words. Results indicated that (1) recognition ability falls off more sharply for Chapter 1 students at 7.5 and 10 degrees of eccentricity than it does for normal readers; (2) recognition ability of the learning disabled population drops less sharply than that of the Chapter 1 group from 7.5 to 10 degrees; and (3) Chapter 1 subjects do not markedly differ from the dyslexics in their foveal (fixation point) or peripheral vision. Findings suggest that improvements in reading achievement, specifically word recognition, may be facilitated by teaching dyslexics to read at the critical point where their letter and syllable identification is most accurate. (KEH)

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The Critical Difference: Identifying the Dyslexic

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Abstract: This study compared three groups of children in three grades (1-3) over their peripheral vision applied to letter-pair and Dolch word recognition. The three groups consisted of children who were:

a) identified as Normal readers
b) in a Chapter I program
c) Learning Disabled and presumed dyslexic

There appears to be significant difference between normal readers and dyslexics in the relation of foveal (fixation point) to peripheral vision (outside the line of direct sight). It may be assumed that these two groups do not have the same perceptual strategies.

A study conducted by Geiger and Lettvin supports this contention. They report that young adults who had received a diagnosis of dyslexia as children, but developed adequate reading skills later had differences in visual processing when compared to a control group of normal readers.

Subjects for the current experiment were primary children, grades 1-3, enrolled in a parochial school, public school, and a university summer reading clinic. A total of 6 normal readers were chosen by classroom teachers in equal numbers by grade to provide a base, or norm. This norm was used to take comparative measures of foveal and peripheral vision from 12 Chapter I and 34 learning disabled students selected by teachers in grades 1-3. All students were of average or above average intelligence.

Procedure: Using a computer and monitor, the children completed three tests. The first was designed to estimate their reception speed of letters presented on the monitor. The second test, Letter-Pair, consisted of presenting 24 letter-pairs on a computer monitor. Each letter-pair was presented at a speed determined by the reception test (usually about .006th of a second) at one of four degrees (2.5, 5, 7.5, and 10) of eccentricity. The third test, Dolch Syllable, consisted of presenting 12 Dolch words appropriate to the child's grade level, "broken" into syllables. The syllables were presented at the aforementioned degrees of eccentricity and speed. The number of correctly identified letters for the Letter-Pair and Dolch Syllable tests constituted the data subsequently analyzed.

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Results: In an analysis of letter pairs, Chapter I and normal readers, grades 1-3, are significantly different in their abilities to indentify the left letter of the pair in their peripheral vision at a .003 probability and at all eccentricities. The normal reader indentified more letters accurately. This was found to be the case for all degrees of eccentricity in the right periphery, .055 probability. When both letters were to be identified, a .003 probability was obtained again in favor of the normal population.

In an analysis of letter pairs, learning disabled and normal readers, grades 1-3, are significantly different in their ability to identify the left letter of the pair in their peripheral vision at a .006 probability and at all eccentricities. The normal reader identified more letters accurately. This was found to be the case for all degrees of eccentricity in the right periphery, .045 probability. When both letters were to be identified, a .014 probability was obtained again in favor of the normal population.

In an analysis of letter pairs, learning disabled and Chapter I readers, grades 1-3, are not significantly different in their ability to identify the left letter of the pair in their peripheral vision at a .431 probability and at all eccentricities.

However, less similarity was found to be the case for all degrees of eccentricity in the right periphery, .625 probability and when both letters were to be identified, a .453 probability was obtained. In all cases, the learning disabled reader had a greater degree of accuracy than the Chapter I population, although the two populations differ only slightly.

In an analysis of Dolch Syllable differences, Chapter I and normal readers, grades 1-3, are significantly different in their ability to identify letters within the left syllable in their peripheral vision at a .108 probability and at all eccentricities. The normal reader identified more letters accurately. This was found to be the case for all degrees of eccentricity in the right periphery, .307 probability. When both letters were to be identified, a .2235 probability was obtained again in favor of the normal population. In all cases, the normal readers have the greater mean.

In an analysis of Dolch Syllable differences, learning disabled and normal readers, grades 1-3, are significantly different in their abilities to identify letters within the left syllable in their peripheral vision at a .236 probability and at all eccentricities. The normal reader identified more letters accurately. This was found to be the case for all degrees of eccentricity for letters within syllables in the

right periphery, .131 probability. When letters in both syllables were to be identified, a .104 probability was obtained in favor of the normal population. In all cases, the normal readers have the greater mean.

In an analysis of Dolch Syllable differences, learning disabled, and Chapter I readers, grades 1-3, are significantly different in their abilities to identify letters within the left syllable in their peripheral vision at a .621 probability and at all eccentricities. More similarity was found to be the case for all degrees of eccentricity for letters within syllables in the right peripheral, .089 probability. When letters in both syllables were to be identified, a .491 probability was obtained. The populations were quite similar in their performance. The learning disabled means of the left and both were slightly greater than the Chapter I's. The Chapter I mean was slightly greater for the right syllable than the mean of the learning disabled.

Findings:

The optimum eccentricity at which each of the populations can recognize letter pairs in the periphery is 5.0 for all populations, learning disabled, Chapter I, and normal readers.

The Chapter I population falls off more sharply as it reaches the upper limits of eccentricity, 7.5° and 10.0°. The L.D. population drops less sharply than the Chapter I group from the 7.5° to 10.0°. These findings are consistent with Geiger (G.) and Lettven (J.Y.).

It was also noted that Chapter I subjects do not markedly differ from the dyslexics in their foveal or peripheral vision. The differences between the two populations is more one of the severity of the degree of eccentricity, favoring peripheral vision, than a similarity to the foveal vision of the normal reader. This relationship is clearly depicted by a 3 way contrast of the groups. Chapter I and LDs had clearly lower mean recognition of letter pairs than normals (F ratios of .015, left .102 right, and .011 both)

Improvements in reading achievement, specifically word recognition, may be facilitated by teaching dyslexics to read atthe critical point where their letter and syllable identification is most accurate.

1. Geiger G., Lettven J.Y. Peripheral Vision in Persons with Dyslexia. New England Journal of Medicine. 1987; 316:1238-43.